TWO SOUTHERN PLANT SPECIES, *NUTALLANTHUS CANADENSIS* (L.) D.A. SUTTON AND *OPUNTIA CESPITOSA* RAF., DISCOVERED AS DISJUNCT IN THE HURON MOUNTAINS, MARQUETTE COUNTY, MICHIGAN

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The Great Lakes region harbors disjunct species from various floristic affinities including western cordilleran, Gulf Coast and Atlantic coastal plain, and the Central North American prairie. The northern Great Lakes region is well known for harboring populations of western cordilleran disjuncts (Marquis and Voss 1981; Drummond et al. 2022), and several hypotheses have been proposed as to how they were able to migrate to the region. Eastward migration during a cooler and moister postglacial period appears most likely. Coastal plain disjuncts may have arrived from the Atlantic and Gulf coasts by making short and moderate distance migrations along post-glacial wetlands (Reznicek 1994). Prairie species expanded eastwards from central North America during a post-glacial warm and dry period and became stranded when conditions changed, resulting in disjunct populations (Manogaran 1983; Reznicek and Maycock 1983). Southern, or "Carolinian," plants are less documented as disjuncts in the northern Great Lakes region. While well represented in the southern Great Lakes region, most regional species with southern affinities have a roughly continuous distribution to the south which is likely due to the continuity of suitable habitat. However, the complex terrain in the Huron Mountains in the western Upper Peninsula of Michigan may allow for enough climatic variation at a fine scale to support populations of species outside their normal ranges.

This article reports the first collection of *Nutallanthus canadensis* (L.) D.A.Sutton (Plantaginaceae) and *Opuntia cespitosa* Raf. (Cactaceae) from the Lake Superior drainage basin, and both appear to be the northernmost occurrences of these species in eastern North America.

Dry, open, sandy or rocky ground, jack pine plains and the beds of dried lakes have been noted as habitats for *Nutallanthus canadensis* in Michigan. Sandy fields, open oak forests, stabilized open dunes and disturbed ground along roadsides have been listed as habitats for *Opuntia cespitosa* in Michigan (MICHIGAN FLORA ONLINE 2011). Both species have broad distributions further south in eastern North America.

A population of *Nutallanthus canadensis* was discovered at the summit of Trout Mountain in the northern Huron Mountains on June 18, 2022 (Figure 1). Fifty plants, nearly all of them in flower, were observed in a granite bedrock glade in openings and under a filtered canopy of *Quercus rubra*. The site was

FIGURE 1. *Nutallanthus canadensis* in flower under *Quercus rubra* on a granite bedrock glade at the summit of Trout Mountain on June 18, 2022. Photo by Ryne D. Rutherford.

south-facing and on top of a fairly steep ledge. Other plants noted include *Arctostaphylos uva-ursi* (L.) Spreng., *Melampyrum lineare* Desr., *Acer rubrum* L., *Woodsia ilvensis* (L.) R. Br., *Carex pensylvanica* Lam., and *Vaccinium myrtilloides* Michx. A moss, *Hedwigia ciliata* (Hedw.) P. Beauv., was also present. An additional ten plants were seen at Mount Ives, 2.8 km to the east on June 19, 2022, and seven were observed at the summit of Breakfast Roll, 5.1 km to the east of the original site on June 20, 2022. Both the Mount Ives and the Breakfast Roll populations were in open locations in shallow soil with similar flora and site characteristics (Table 1).

TABLE 1. Habitat characteristics for the three populations of *Nutallanthus canadensis* in the northern Huron Mountains. The values given are mean values recorded in 12 one-meter square plots along 100-meter transects recorded in September 2022.

Site	Elevation (m)	Canopy Cover (%)	Vascular Plant Coverage (%)	Exposed Bedrock (%)	Distance to Lake Superior (km)	Slope Azimuth	Aspect
Trout Mountain	391	25	25	38	3.2	18	170
Mount Ives	331	24	10	68	3.5	15	200
Breakfast Roll	354	9	31	47	3.9	5	180

FIGURE 2. *Opuntia cespitosa* in a small glade on the north side of the Little Garlic River on August 1, 2022. Photo by Ryne D. Rutherford.

Opuntia cespitosa was found on a small (10×14 m) south-facing glade on the north side of the Little Garlic River in the central Huron Mountains at 418 m elevation (Figure 2). Plants were found in small pockets of soil and on bare metamorphic rock of mostly mafic composition on August 1, 2022, on an overcast raining morning with an air temperature of 16°C. A total of six plants were found, one patch occupied about four square meters, and another occupied two square meters. Two fresh blooms and fifteen spent flowers were observed along with a single bud. No developing fruits were found, and no pollinators were present. The glade, which contained a few small openings, occurred along a ridge that trended east-west and was mostly dominated by *Pinus strobus* L. The plants occurred under a filtered canopy, about 70% open. Other plants included *Vaccinium angustifolium* Aiton, *Diervilla lonicera* Mill., *Dicanthelium xanthophyllum* , *Capnoides sempervirens* (L.) Borkh., *Hieracium piloselloides* Vill., *Quercus rubra* L., *Juniperus communis* L., *Danthonia spicata* (L.) Roem. & Schult., and *Amelanchier* sp. The open patches of rock were lichen-dominated, including the following species: *Stereocaulon saxatile* H. Magn., *Cladonia mitis* Sandst., *Cladonia rangiferina* (L.) F. H. Wigg., *Cladonia turgida* Ehrh. Ex Hoffm., *Cladonia gracilis* (L.) Willd., *Lepraria neglecta* (Nyl.) Erichsen, *Diploschistes scruposus* (Schreber) Norman, *Umbilicaria deusta* (L.) Baumg., *Acarospora fus-*

TABLE 2. Ground surface temperature metrics for granite bedrock glades (n=2) and the surrounding forest (within 50 meters of the glade edge) (n=4) from May 7 to September 14, 2021, recorded with HOBO™ data loggers. All the loggers were placed directly on the ground.

Temperature Metrics	Glade	Matrix
Mean Max °C	52	32
Mean Min °C	0	1
Mean °C	23.4	17.8
Hours above 30 °C	750	7.8

cata B. de Lesd. and *Porpidia* sp. One moss species, *Polytrichum juniperum* Hedw., was noted.

The nearest record of *Nutallanthus canadensis* is 120 km to the south along the Menominee River on the Michigan/Wisconsin border and the closest continuous populations are 300 km SW in central Wisconsin along the Wisconsin River and 300 km SE in the northwestern Lower Peninsula of Michigan. The nearest apparently natural populations of *Opuntia cespitosa* are in the west-central Lower Peninsula of Michigan (370 km SSE) and from south-central Wisconsin (400 km SSW). (GBIF 2023; MICHIGAN FLORA ONLINE 2011). This is the first time *Opuntia cespitosa* has been collected in the Upper Peninsula of Michigan and the first reported collection from a rock outcrop in Michigan.

While the origin of these southern disjuncts cannot be known with certainty, natural colonization during the post-glacial hypsithermal warm period ca. 5,000 years BP is the most likely origin. The warm, dry conditions during the hypsithermal are known to have allowed for the northward and eastward colonization of many species and suitable local conditions allowed persistence of populations as the climate cooled (Reznicek and Maycock 1983; Strong and Hills 2003; Hamilton and Eckert 2007). The local conditions on granite bedrock glades in the Huron Mountains are warmer than the surroundings, which may allow the persistence of species that are otherwise poorly suited to the regional climate in the Lake Superior region (Table 2).

SPECIMEN CITATIONS

Opuntia cespitosa: MICHIGAN. Marquette County. 46.64256 -87.64070. August 1, 2022. *Ryne D. Rutherford 200* (MICH), *201* (FLAS).

Nutallanthus canadensis: MICHIGAN. Marquette County. 46.86539 -87.88969. August 1, 2022. *Ryne D. Rutherford 202* (MICH).

ACKNOWLEDGMENTS

Many thanks to Kerry Woods, and the Huron Mountain Wildlife Foundation, my advisor David Flaspohler, and Michigan Technological University for supporting this research. Thanks to Susan Fawcett for excellent work at specimen preparation. Many thanks to Michael Huft for his timely and thoughtful edits of this manuscript.

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NOTEWORTHY COLLECTIONS

SIXTEEN SPECIES NEW FOR MINNESOTA, WISCONSIN, THE GREAT LAKES REGION, OR NORTH AMERICA

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Allium ramosum L.
Alliaceae (often included in Amaryllidaceae)
Fragrant-flowered garlic

Significance of the Report. Apparently the first collection of this non-native forb from outside of cultivation in North America north of Mexico.

Previous Knowledge. The herbaceous perennial *Allium ramosum* is native to somewhat dry open habitats in China, Kazakhstan, Mongolia, and Russia (Xu and Kamelin 2000) and is cultivated for culinary use, sometimes followed by escape, in those countries and in Kyrgyzstan and Tajikistan (Seregin and Korniak 2013). Although it was cultivated in Europe by the middle of the 18th century (Stearn 1944), its escape to non-cultivated settings there was not detected until the past half-century (Seregin and Korniak 2013). It is thought to be closely related to *Allium tuberosum* Rottler ex Spreng. (Xu and Kamelin 2000), which is cultivated in North America (as "Chinese chives") for culinary use and has escaped in parts of the central United States (Kartesz 2015). Both species may be grown as ornamentals (Davies 1992). *Allium ramosum* has often been considered to include *A. odorum* L. in synonymy, the nomenclature and typology being rather confused (Stearn 1944; Xu and Kamelin 2000). Most works do not list a vernacular name in English; "fragrant-flowered garlic," however, is given by Bailey and Bailey (1976), although the plant lacks a sizable edible bulb like that of garlic (*Allium sativum* L.). Xu and Kamelin (2000) reported the Chinese vernacular name as "ye jiu."

Discussion. *Allium ramosum* was found between an active railroad track and a long-abandoned branch track in Duluth, Minnesota. It had about 100 flowering shoots irregularly distributed within an approximately 15 m^2 sunny, moderately drained site, with *Asclepias syriaca* L., *Bromus inermis* Leyss., and *Tanacetum vulgare* L. the most abundant species near it. In both 2020 and 2021 abundant seed was produced. At the times the flowering specimens were collected, the species was not seen in other open habitats in the area, or in cultivation on the nearest residential properties as visible from the streets.

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Diagnostic Characters. Shoots were glabrous, in small clusters, growing from very narrow bulbs connected by a rhizome. Bulb tunics became weakly fibrous and somewhat lustrous. The herbage had a strong alliaceous odor. A few plants flowered earlier and were much taller than most of the population. Their scapes were up to about 1 m tall and 6 mm diameter near the base, tapering to 3 mm diameter near the tip, with a single spiral rib. The scape's fistula was about 3 mm diameter near the base, tapering to about 1 mm diameter near the tip. The leaves were erect, attached within the basal one-eighth of the scape, up to 8 mm wide, channeled but not abaxially keeled, entire, and twisted along their 4–5 dm length. Leaves had a central cavity with a cross-sectional shape like that of the whole blade, 2–3 mm wide and ca. 0.2 mm high nearer the base, becoming internally solid distally. Umbels were erect, congested-fasciculate, about 5 cm in diameter, and lacked bulbils. The perianth was bright white, most of the tepals having a midvein that was abaxially greenish or dark reddish. Tepals were about 9 mm long, 3 mm wide, and naviculate very near their tip. Filaments were about 5 mm long and adnate to the perianth near their connate bases, white, and unappendaged. Anthers were about 1 mm long, with yellow pollen. The style was white on a bright green tuberculate ovary that lacked crests. Living flowers were broadly campanulate and had a very evident pleasant "floral" fragrance. For illustrations see Choi and Oh (2011), Seregin and Korniak (2013), or POWO (2022). The shorter plants had their umbels still contained by their bracts on the date the first flowering material was collected. When these were in flower two weeks later, their scapes were up to 65 cm tall, with leaf and other stem dimensions proportionately less than those of the taller plants. Umbels and flowers were much the same as those of the early flowering plants, but with fewer flowers per umbel.

Fruiting pedicels were about 2.5–3 cm long. There were typically about 40–50 fruits per umbel on tall plants, 20–25 per umbel on short plants, the pericarp dehiscing; the two seeds per carpel were about 4 mm long, irregularly angular, black, and lustrous. Stearn (1944) illustrated variation in fruit shape. The umbels became closer to hemispherical as the fruits grew. Somatic chromosome numbers of 16 and 32 have been reported for this species (Xu and Kamelin 2000; Choi and Oh 2011). Seedling root tips were fixed, stained with lacto-aceto-orcein, squashed, and observed at 1000× with both bright-field and phase-contrast illumination. Seedlings from both the tall-early and the short-late plants had 16 condensed chromosomes per mitotic anaphase daughter set.

Allium tuberosum differs, in part, by having leaves that are internally solid throughout and by coming into flower after *A. ramosum* has finished flowering (Stearn 1944). In Duluth, cultivated *A. tuberosum* was still flowering in late September, in a place that appeared to have a warmer microclimate (directly in front of a sunny southwest-facing masonry wall) than the collection site did. Xu and Kamelin (2000) described leaves of *A. ramosum* as abaxially keeled, in contrast to those of *A. tuberosum*, but among Duluth plants we observed the reverse, consistent with Stearn (1944). Stearn (1944) contrasted the flowers of *A. tuberosum* as having somewhat shorter tepals that spread more widely than those of *A. ramosum*, and stamens almost as long as the tepals, and our observations were consistent with these. We judged the floral fragrance to be similar in both

species. According to Stearn (1944) the senesced tepals of *A. ramosum* are appressed to the fruit, whereas those of *A. tuberosum* usually are not; on our plants they were appressed on both species. Stearn (1944) includes a key for distinguishing the other species that are most like these two.

Specimen Citations. MINNESOTA. St. Louis Co.: Duluth, Sec. 13, T49N R15W, fruiting, August 31, 2020, seeds collected September 7, 2020, *Schimpf 1048* (DUL); same location, taller plants flowering, July 22, 2021, seeds and bulbs collected September 15, 2021, *Schimpf 1065* (DUL); same location, shorter plants flowering, August 8, 2021, seeds and bulbs collected September 15, 2021, *Schimpf 1066* (DUL).

Aquilegia vulgaris L.
Ranunculaceae
European columbine

Significance of the Report. Apparently the first collections of this non-native ornamental documented from outside of cultivation in Minnesota.

Previous Knowledge. The herbaceous perennial *Aquilegia vulgaris* is native in much of Europe (Akeroyd 1993) and cultivated in North America for its floral display. Although Whittemore (1997) included southeastern and extreme northeastern Minnesota as part of its escaped range, Kartesz (2015) and USDA NRCS (2022) do not indicate any vouchered occurrences of the species in Minnesota, and there are no collections from Minnesota shown in Minnesota Biodiversity Atlas (2022). A specimen collected in an iron-mining boomtown in St. Louis County in 1896 (MO 51364) has no label information indicating whether it was wild or cultivated (Tropicos 2023). A collection from Hennepin County in 1949 (ASC 15642) that purports to be this species appears to be *A. canadensis* L. (vPlants 2023).

Discussion. Two individuals of *Aquilegia vulgaris* were found in 2020 growing in the bottom of a valley of a small stream in Duluth, Minnesota. They were in a local depression separated from the stream by slightly higher ground, a site that evidently receives overflow occasionally but was not wet at the time. The stream drains a neighborhood of single-family homes. The nearest residential yard is about 15 m away, up a steep and thickly vegetated slope. The columbines were shaded by large *Salix* ×*fragilis* L., and common species nearby included *Heracleum maximum* W. Bartram, *Rubus parviflorus* Nutt., and *Hesperis matronalis* L. The two columbines were about 1 m apart, and each had two flowering stems as much as 9 dm tall. Flowers were pendent or faced laterally; the perianth was deep purplish blue, grading to a pale yellowish patch a few mm long at the apex of each sepal. *Aquilegia vulgaris* was also found in 2021 growing beneath downward-directed exhaust ducts from a large bank of laundry dryers. There were about 25 plants in a range of sizes, distributed irregularly on a bed of coarse rounded stones that comprised about 10 m^2, plus a few that began flowering later on an adjoining bark-chip surface several meters lateral to the warm-air exhausts. This was in morning sun, then deep shade from a tall building the rest of the day, and not near a site where columbines were

cultivated. These plants had pale perianths with a bluish tint. There were no other plants growing on the stones. At a third site in the same county, on June 27, 2020 one plant was seen 18 km to the southwest of the two plants discovered earlier in 2020. It was about 2 dm tall and had a single laterally facing flower with deep purplish blue perianth. On June 11, 2021 it had four flowers; no collection was made there in either year. It was in deciduous shade at the moist base of a slope next to a public recreation trail of crushed limestone, with no cultivated ground within sight.

Diagnostic Characters. Among columbines known outside of cultivation in North America, *Aquilegia vulgaris* can be recognized by its petal spurs that are ≥ 14 mm long and strongly inwardly hooked (Whittemore 1997). Its cultivated selections include some with white or reddish perianths, and it may also give evidence of interspecific hybridization (Whittemore 1997). The pistils are pubescent. The North American native *A. brevistyla* Hook. also has inwardly hooked spurs. However, its spurs are no more than 10 mm long, and its styles in fruit are no more than 4 mm long, versus at least 7 mm in *A. vulgaris* (Whittemore 1997).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, near boundary of Secs. 5 and 8, T50N R13W, flowering, June 19, 2020, *Schimpf 1028* (DUL); Duluth, Sec. 14, T50N R14W, flowering and fruiting, June 13, 2021, seeds collected July 15, 2021, *Schimpf 1057* (DUL).

Centaurea nigrescens Willd.
Asteraceae
Tyrol knapweed or short-fringed knapweed

Significance of the Report. Clarification of the evidence for the occurrence of this non-native weed in Minnesota.

Previous Knowledge. A short-lived herbaceous perennial native to Europe, *Centaurea nigrescens* has frequently been referred to in North America as *C. dubia* S. G. Gmel. or *C. vochinensis* Bernh. ex Rchb. (Keil and Ochsmann 2006). It is widely distributed in the United States and Canada (Kartesz 2015; USDA NRCS 2022), although those two maps do not agree well on locations. Kartesz (2015) coded this species as having noxious weed status in Washington, Oregon, and Idaho. The only record shown for Minnesota by Kartesz (2015) is St. Louis County, presumably on the basis of the report in Lakela (1965) of a collection of *C. dubia*. USDA NRCS (2022) and Keil and Ochsmann (2006) show no occurrences in Minnesota for this species. The collection cited by Lakela was made in 1953 along Minnesota Highway 73 somewhere north of the city of Chisholm, where it was "infrequent" (Lakela 1965). A collection made in 2019 from Lake County (MIN 968461, 968462) that had been determined as *C. nigrescens* appears to us not to be that species; no heads are longer than wide, and the phyllary appendages spread widely and make the involucre dark overall (images at Minnesota Biodiversity Atlas 2022).

Discussion. In 2005 we attempted to find the population from which Lakela had collected in 1953. We found *Centaurea* L. to be common for about 500 m

along the east side of that highway some 40 km north of Chisholm; there were also a few plants on the west side of the highway there. Most of these knapweeds were *C.* ×*moncktonii* C. E. Britton, meadow knapweed, mixed with a smaller number of *C. phrygia* L., wig knapweed (Schimpf et al. 2007); we were not able to determine any of them as *C. nigrescens*. Our failure to find *Centaurea* elsewhere along that highway and our examination of the specimens that Lakela had deposited at DUL lead us to conclude that she had collected only *C.* ×*moncktonii* in 1953. In 2017 we found a population of *C. nigrescens* about 50 km north of the site that we had collected from in 2005. The plants were scattered for about 700 m on both sides of St. Louis County Highway 129 near the boat landing at the Ash River. As a result, *C. nigrescens* is more definitively documented as growing in St. Louis County. The map by Kartesz (2015) is correct for St. Louis County, but for an outdated reason. Other geographic descriptions now have evidence for adding Minnesota or St. Louis County to this taxon's introduced range.

Diagnostic Characters. Character states of the involucre and its phyllaries are pivotal for identifying knapweed species in North America (Keil and Ochsmann 2006). For *Centaurea nigrescens*, the pressed involucres are not wider than long and are often longer than wide, and their lower phyllaries each have a dark appendage that is pectinately dissected but not spiny or nodding, and does not obscure the green bodies of its flanking phyllaries (Keil and Ochsmann 2006), making the involucre comparatively pale overall.

Specimen Citations. *Centaurea nigrescens*: MINNESOTA. St. Louis Co.: N½Sec. 5, T68N R19W, flowering and fruiting, September 7, 2017, *Pomroy and R. Barnes 3054* (DUL, MIN), determined by D. J. Schimpf 2017. *Centaurea* ×*moncktonii*: MINNESOTA. St. Louis Co.: flowering, August 4, 1953, *Lakela 16543* (DUL, MIN), determined by D. J. Schimpf 2008; Linden Grove Twp., NW¼Sec. 2, T62N R20W, flowering, September 11, 2005, *Schimpf 416* (DUL, MIN).

Dysphania pumilio (R. Br.) Mosyakin and Clemants
Amaranthaceae
Clammy goosefoot

Significance of the Report. Apparently the first collection of this non-native weed in Minnesota.

Previous Knowledge. *Dysphania pumilio* is an annual native to Australia (Clemants and Mosyakin 2003). In the upper Great Lakes states it has been collected from one county in southwestern Wisconsin (Kartesz 2015) and two counties in southeastern Michigan (MICHIGAN FLORA ONLINE 2011). Earlier works (e.g., Gleason and Cronquist 1991) treated it as *Chenopodium pumilio* R. Br. More recently Zhang and Zhu (2016) classified it as *Neobotrydium pumilio* (R. Br.) M. L. Zhang and G. L. Chu.

Discussion. A population of *Dysphania pumilio* covering several square meters was found in 2019 near a large community garden in Duluth, Minnesota. The plants were growing near a reserve pile of loamy topsoil outside of the fence

surrounding the cultivated area, in full sun and with moderate drainage. One would guess that seeds of this species had been in topsoil moved there from somewhere else. By late summer 2021, *D. pumilio* was widespread in the cultivated area. The vegetation immediately surrounding the garden site is dense tall herbaceous cover and probably not favorable for establishment by this low-growing annual.

Diagnostic Characters. *Dysphania pumilio* has sprawling stems and sinuately toothed leaf blades much like those of the more widely seen *Chenopodium glaucum* L. Unlike *C. glaucum*, the farinose pubescence on the herbage and perianth of *D. pumilio* is golden and aromatic (Clemants and Mosyakin 2003). Also in the Great Lakes region are *D. ambrosioides* (L.) Mosyakin and Clemants and *D. botrys* (L.) Mosyakin and Clemants (Kartesz 2015). *Dysphania pumilio* differs from them in having seeds positioned vertically and segmented hairs on its stems (Clemants and Mosyakin 2003).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 16, T50N R14W, flowering and fruiting, August 19, 2019, *Schimpf 1005* (DUL).

Houttuynia cordata Thunb.
Saururaceae
Fishwort

Significance of the Report. Apparently the first collection of this non-native forb from outside of cultivation in the Great Lakes region.

Previous Knowledge. *Houttuynia cordata* is an herbaceous perennial that is native from east Asia to south Asia (Xia and Brach 1999). It has culinary and medicinal use in its native range (Hedrick 1972; Xia and Brach 1999; Hu 2005), and research on its medicinal properties appears in the recent scholarly literature. There are forms in the nursery trade with variegated leaves in several colors, and other cultivars that produce citrus-like fragrances instead of the fishy smell of the wild type (Brickell and Zuk 1997). It is planted in North America as a ground cover that spreads rhizomatously. Brickell and Zuk (1997) label it as invasive in moist soil. In its native range it is found in open to shaded habitats that do not become dry (Xia and Brach 1999). Occurrences outside of cultivation in the United States have been collected from several counties in the mid-Atlantic or Gulf of Mexico regions (Kartesz 2015). All of these may be fairly recent reports, as the species was not included in Buddell and Thieret (1997). A reliable (J. T. Kartesz, personal communication) report from Hamilton County, Indiana, not connected to a voucher specimen, seems to be the known escape closest to the Great Lakes region.

Discussion. A small colony of *Houttuynia cordata* was found in 2020 in a community garden in Duluth, Minnesota, used for vegetable crops. We could not be certain whether the colony had been deliberately planted, but it did not look like it was being tended. The colony was in a long-grass strip where gardeners walk between the plots that are in active use, in full sun and moderately drained. Several shoots were seen, not all of which were in flower. The plants were connected by horizontal rhizomes. These shoots were non-variegated, green, and smelled like fish. It appears that the colony could spread further within this large

garden or beyond it. In August 2021 the plants were still there despite two consecutive dry summers, with seepage from the irrigated garden plots seeming to counteract the shortage of rain.

Diagnostic Characters. *Houttuynia cordata* can get several dm tall; the leaves are alternate, have conspicuous fused stipules sheathing the petioles, and palmately veined cordate blades up to about 10 cm long. The inflorescence is a vertical spike to about 2.5 cm long with numerous small yellowish flowers that lack a perianth, and four (rarely six or eight) white bracts 1–1.5 cm long spreading at its base (Xia and Brach 1999). Illustrations may be found in Brickell and Zuk (1997), Morley (1993), and Spaulding et al. (2018).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 23, T49N R15W, flowering, July 19, 2020, *Schimpf 1040* (DUL).

Iris sibirica L.
Iridaceae
Siberian iris

Significance of the Report. Apparently the first collection of this non-native ornamental forb from outside of cultivation in Minnesota.

Previous Knowledge. The herbaceous perennial *Iris sibirica* is native to much of Eurasia and is widely cultivated for ornament in North America, where it has escaped to roadsides (Henderson 2002). Reporting of its spread beyond cultivation in northeastern North America (Kartesz 2015) seems to be recent, in that the species is not included in Fernald (1950) or Gleason and Cronquist (1991). In the western Great Lakes region it seems to have been reported only from Michigan (Kartesz 2015), first collected from Schoolcraft County in the Upper Peninsula in 1996, then in 2013 from Mecosta County in the Lower Peninsula (MICHIGAN FLORA ONLINE 2011).

Discussion. A few clumps of *Iris sibirica* were found close to each other in tall herbaceous roadside vegetation in Duluth, Minnesota. This site is protected from mowing by a guard rail and is not near any likely cultivation. The plants were exposed to full sun and sat above a steep slope in coarse-loamy soil. They were still there in June 2022, but no local spread since 2017 was noticed even though we observed seed production in the intervening years.

Diagnostic Characters. *Iris sibirica* lacks a beard of long hairs on its sepals, which are usually blue (as in this collection) but may be white (Henderson 2002). Typically at least 6 dm tall (Henderson 2002), it can be distinguished from other non-dwarf species of *Iris* L. in the region by leaves that are less than 9 mm wide and hollow aerial stems (Voss and Reznicek 2012).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 15, T50N R14W, flowering, June 25, 2017, *Schimpf 891* (DUL, MIN).

Malus ×*robusta* (Carr.) Rehder
Rosaceae
Hybrid Siberian crab apple

Significance of the Report. Apparently the first collection of this non-native deciduous tree from outside of cultivation in Wisconsin.

Previous Knowledge. *Malus* ×*robusta* results from cross-fertilization between the Asian-native trees *M. baccata* (L.) Borkh., Siberian crab, and *M. prunifolia* (Willd.) Borkh., Chinese crab (Rehder 1960). The parent species are planted in North America as ornamentals, and the larger-fruited *M. prunifolia* also has culinary use (Hu 2005). Deliberate crosses between them are made by the nursery industry to create hardy ornamental trees with usable fruit. Spontaneous hybridization between the parents can also happen via insect pollinators. Both of the parent species are also grown from seed as rootstocks for orchard apples, *M. pumila* Mill., (Dickson 2014) and could develop flowering sprouts from below the graft. *Malus* ×*robusta* was collected from outside of cultivation in one county of southeastern Ohio (Vincent et al. 2011). Kartesz (2015) showed this as the only North American record from the wild, whereas USDA NRCS (2022) showed it as also occurring in one or more unspecified counties of New York. A non-cultivated specimen with stout residual calyces, collected from Bronx County, New York in 2008 (NY 1087610) was determined as *M. robusta* (Carrière) Rehder (vPlants 2023). Schimpf and Pomroy (2017) later made a collection from one tree in St. Louis County, Minnesota.

Discussion. A single large tree of *M.* ×*robusta* was found in rural northwestern Wisconsin. It was near the bottom of a steep highway bank, rooted in moist loamy soil. It had three trunks, the largest of which was 15 cm diameter close to its near-basal junction with the other trunks, reaching a height of 5–6 m in a thicket of *Alnus incana* (L.) Moench and occasional *Prunus virginiana* L. There were numerous holes in the bark of this crab apple, of the size and pattern made by yellow-bellied sapsuckers (*Sphyrapicus varius* L.), but the vigor of the tree did not appear to suffer from that. The thicket was not overtopped by larger trees. Other nearby landscape features were an active railroad and a stand of large deciduous trees; buildings and obviously cultivated plants were lacking. No younger individuals of *Malus* were seen in the vicinity.

Diagnostic Characters. *Malus* ×*robusta* fruits are about 2 cm in diameter, subglobose, impressed on both ends, and lack a calyx (Rehder 1960). There may be inconsistent retention of the calyx (Rehder 1960), but all of the dozens of fruits examined from this tree were calyx-free. These fruits were closer to 1.5 cm in diameter, smaller than those described in Schimpf and Pomroy (2017), and were on shorter pedicels, no more than 2.5 cm long. Cuizhi and Spongberg (2003) described *M. prunifolia* var. *prunifolia* as lacking sepals in fruit, with fruits 2–2.5 cm diameter and pedicels 2–3.5 cm, but the fruits of that species are not impressed at the apex (Rehder 1960).

Specimen Citations. WISCONSIN. Douglas Co.: Solon Springs Twp., NW¼ Sec. 12, T45N R12W, flower buds just opening, May 13, 2017, *Schimpf 881* (DUL); same tree, fruiting, September 1, 2017, *Schimpf 920* (DUL).

Malva alcea L.
Malvaceae
Hollyhock mallow

Significance of the Report. Apparently the first collections of this ornamental forb from outside of cultivation in Minnesota.

Previous Knowledge. The herbaceous perennial *Malva alcea* grows to about 1.5 m tall. Native to Europe (Hill 2015), it has been cultivated in North America for its showy pink to white flowers (Brickell and Zuk 1997). Its escape to non-cultivated environments has not been previously documented for Minnesota, but collections are known from Wisconsin and Michigan, many other northeastern states, and eastern Canadian provinces (Kartesz 2015).

Discussion. A multi-stemmed individual of *Malva alcea* was found in tall roadside vegetation in each of two places in Duluth, Minnesota, which are about 8 km apart. Both locations are strongly exposed to sun and have well-drained loamy soils. One site is in an industrial area, and the other is wild public land near a residential neighborhood. Plenty of seeds were produced by these plants, but no conspecifics were seen nearby. The site of the 2018 collection was destroyed by construction in 2020, and the plant that we first saw in 2019 was not found there in 2020.

Diagnostic Characters. *Malva* is very similar to *Lavatera* L. The latter genus differs by having the three bractlets that subtend the calyx connate for about half their length, as well as by a swollen style base that persists on its fruit (Fryxell and Hill 2015). *Malva alcea* and *M. moschata* L. are distinguished from other species of *Malva* in North America by the deeply palmate lobes of their upper leaves; *M. alcea* is further separable from *M. moschata* by mericarps that are more numerous (18–20 per fruit) and less hirsute, broader bractlets, and abundant stellate hairs on the pedicels and calyces (Hill 2015). The pink petals became blue when dry.

Specimen Citations. MINNESOTA. St. Louis Co.: Duluth, Sec. 8, T49N R14W, flowering, July 10, 2018, *Schimpf 940* (DUL); Duluth, Sec. 15, T50N R14W, flowering, July 25, 2019, *Schimpf 992* (DUL).

Miscanthus sinensis Anderss.
Poaceae
Eulalia

Significance of the Report. Apparently the first collection of this non-native ornamental herbaceous perennial from outside of cultivation in Minnesota.

Previous Knowledge. A native of much of China (Chen and Renvoize 2006), Korea, and the islands from the southern Kuriles southwestward through Taiwan (Darke 1999), the clump-forming tall grass *Miscanthus sinensis* has long been planted as an ornamental in North America. It is known to be escaped in Ontario and much of the eastern United States, plus a few occurrences in the western United States (Kartesz 2015).

Discussion. A population of *Miscanthus sinensis* was found in a planting of

other ornamental grasses on the University of Minnesota Duluth campus. The planting was not especially weedy overall. These eulalia plants were within a long curved row of evenly spaced clumps of *Sporobolus heterolepis* (A. Gray) A. Gray, as well as between that row and a parallel one of a *Calamagrostis* Adans. cultigen, on moderately drained ground with a bark-chip surface. There were seven patches of *M. sinensis* located irregularly along about 25 m, with from one to several clumps per patch and a total of more than 100 flowering culms. We do not know if any of the clumps had established from seed produced by a neighboring clump. These patches were still there one year after the collection was made. Two other patches of eulalia, ca. 300 m and ca. 600 m away from the collection site, respectively, appear to have been planted on the campus. They were symmetrical continuous masses within larger expanses of tall herbaceous cover, observed in autumn in both 2020 and 2021. All of these campus populations were cut close to the ground in the course of standard maintenance later in the autumn of both years.

Diagnostic Characters. This is one of two species of *Miscanthus* Andersson known to have escaped in North America north of Mexico (Barkworth 2003; Kartesz 2015). They share robust stature, leaf blades with wide white midribs, and plumose panicles with long branches (rames) that emerge late in the growing season. *Miscanthus sinensis* differs from *M. sacchariflorus* (Maxim.) Hack. by the former's non-rhizomatous habit, its callus hairs that are no more than twice the length of the spikelet, and its longer awns (Barkworth 2003). These two species can be cross-bred to yield the sterile hybrid *M.* ×*giganteus* J. M. Greef and Deuter ex Hodkinson and Renvoize (Meyer 2004), which is being researched for biomass production (Anderson et al. 2011). The cespitose perennial grass *Andropogon gerardii* Vitman is comparable to *M. sinensis* in height and has an inflorescence of superficially similar structure but fewer rames. *Andropogon gerardii* is a common native in eastern and central North America and is also planted ornamentally, for watershed protection, or to restore native plant communities (Campbell 2003). It lacks the large white midrib and often has dark red-purple color develop in its culms and inflorescences. *Andropogon gerardii* culms have solid internodes. The *M. sinensis* culms that we examined had hollow internodes, although Chen and Renvoize (2006) describe them for the species as solid. The *M. sinensis* plants had silvery callus hairs, with dark red-purple anthers and stigmas exserted from their florets after flowering began in late August. Their rames drooped conspicuously to form loose panicles about 20 cm wide, on shoots 1.5–2 m tall. There are numerous cultivars of *M. sinensis*, which may differ considerably in size, morphology, color pattern, flowering time, and cold-hardiness (Darke 1999; Meyer 2004). We did not determine these plants infraspecifically, but they were not one of the cultivars that have variegated or striped leaf blades.

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 14, T50N R14W, flowering, September 6, 2020, *Schimpf 1050* (DUL).

FIGURE 1. Live winter twig and axillary bud from *Neillia incisa*, Duluth, Minnesota, autumn 2019. Lines on the grid are 1 mm apart. The leaf scar is immediately to the left of the bud. Photograph by David J. Schimpf.

Neillia incisa (Thunb.) S. H. Oh
Rosaceae
Lace shrub

Significance of the Report. Apparently the first collection of this non-native ornamental shrub after vegetative spread from cultivation in the Great Lakes region.

Previous Knowledge. Native to Korea, Japan, Taiwan, and northeastern China (Oh 2006), *Neillia incisa* is a deciduous shrub grown ornamentally in North America for its overall form and autumn color (Brickell and Zuk 1997). This species has traditionally been treated as a member of the genus *Stephanandra* Siebold & Zuccarini, as *S. incisa* (Thunb.) Siebold & Zuccarini, but it has recently been shown that *Neillia* should be expanded to include *Stephanandra* (Weakly and Wright 2014). Its spread outside of cultivation in the United States or Canada is documented by collection apparently only for Chesterfield County, Virginia (Kartesz 2015), where it has crept for short distances in deciduous shade by rooting of the twig tips (Weakley and Wright 2014). Snyder et al. (2000) rate the species winter-hardy in zone 4 if somewhat protected.

Discussion. A few individuals of *Neillia incisa* were found to have spread a

short distance by rooting of their twig tips in deciduous woods near residences in Duluth, Minnesota. They were with other non-native ornamentals (*Spiraea japonica* L. f., herbaceous *Paeonia* L. sp., and *Hemerocallis* L. sp.) at a long-abandoned satellite planting or old garden disposal spot. *Neillia* occupied 2–3 m^2 and was about 6 dm tall. The site was shaded by large trees of *Fraxinus nigra* Marshall, *Populus balsamifera* L., and *Betula papyrifera* Marshall, with the ornamentals about 10 m into the woods from the edge of a back yard to its north. The soil is very high in clay, weakly drained where *Neillia* grew. No evidence of saltational spread by seed was observed. The collection site is in hardiness zone 4b (USDA ARS 2012), which is the less severe portion of zone 4.

Diagnostic Characters. *Neillia incisa* has very slender zig-zag twigs that arch to the ground, lobed simple leaves, and narrow panicles of small whitish flowers that are not very showy. The leaf blade's shape and size may give the impression of *Ribes* L., but the leaves of *Neillia* have obvious stipules. The Duluth plants are probably the cultivar 'Crispa,' as they have its shorter stature and more intricately lobed leaves (Brickell and Zuk 1997). Yi (1958) provides a drawing and description of the twigs and buds of the species during the leafless season. However, the Duluth plants in late autumn differed from that because their twigs were quite pubescent and their axillary buds (Figure 1) occurred singly instead of as superposed pairs, apparently indications of intraspecific variation. Superposed buds are also described in Snyder et al. (2000). Taxa that somewhat resemble *N. incisa* may be distinguished by consulting works that treat the Rosaceae at a continental level (e.g., Rehder 1960; Lingdi et al. 2003; Phipps 2014).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 5, T50N R13W, flowering, July 24, 2019, *Schimpf 990* (DUL).

Physostegia parviflora Nutt. ex A. Gray
Lamiaceae
Small-flowered obedience

Significance of the Report. Evidence of the occurrence of this native forb, or perhaps its hybrid progeny, outside of cultivation in Minnesota.

Previous Knowledge. All species of *Physostegia* Benth. are fibrous-rooted herbaceous perennials endemic to North America (Cantino 1982). *Physostegia parviflora* is native to western Canada and the northwestern part of the conterminous United States, where it grows in wet soil (Cantino 1982). The major maps (Great Plains Flora Association 1977; Cantino 1982; Kartesz 2015; USDA NRCS 2022) disagree among themselves about the eastern end of its geographic range, including Minnesota. This confusion may be a result, at least in part, of unrecognized local spread from cultivation or difficulty in identification. *Physostegia parviflora* apparently has had rather limited medicinal use by Native Americans (Moerman 1998). Cantino (1982) questioned whether a collection of *P. parviflora* made in 1883 had been mislabeled as being from southeastern Minnesota. At least 15 collections made in northeastern Minnesota or nearby Wisconsin or Ontario, which others had determined as *P. parviflora*, were all annotated as the closely related *P. virginiana* (L.) Benth. by P. D. Cantino in 2009.

The Minnesota Biodiversity Atlas (2022) does not show any *P. parviflora* specimens collected from Minnesota.

Discussion. A local population of no more than ten plants growing on the edge of St. Louis Bay along the St. Louis River in Duluth, Minnesota is assignable to *Physostegia parviflora*. These plants were rooted on a mass of old lumber in a small cove in an industrial area. This floating wood also supported a dense growth of *Lycopus asper* Greene, *Bidens cernua* L., *Persicaria hydropiper* (L.) Delarbre, *Mimulus ringens* L., and *Scutellaria galericulata* L., a mix of native and non-native species covering several square meters in minimal shade. The buoyant substrate should have kept the water level experienced by the plants consistent despite frequent sizable changes in the surface elevation of the river, which often varies within about 10 cm every few hours and can approach 30 cm within a day (Trebitz 2006). In the dry years 2020 and 2021, the water levels were much lower, stranding the wood on the mud, and *P. parviflora* was not found in that area. *Mimulus ringens* was also not seen on the site in those years.

A fragmentary collection made in 1936 by Olga Lakela from a sedge meadow near Superior Bay on the St. Louis River in Duluth was not determined to species by Lakela or sent to P. D. Cantino for possible annotation. We assign it to *Physostegia parviflora.* We did not find *P. parviflora* growing in what we believe to be the 1936 collection area when we looked for it in autumn 2019. Because these collections may represent rare occurrences in Minnesota of *P. parviflora* or its interspecific hybrid, the usual degree of locational detail is not provided here. The very limited extent of these occurrences leads us to doubt whether *P. parviflora* is persistently established near the St. Louis River or existed there before European arrival.

Diagnostic Characters. The approximately 12 species of *Physostegia* differ from each other in their combinations of character states, but no species has a single morphological character state that is both unique within the genus and present in all of its members (Cantino 1982). Of the eight characters that Cantino (1981) proposed as the most important for separating *P. parviflora* from *P. virginiana* and their putative tetraploid hybrid, *P. ledinghamii* (Boivin) P. D. Cantino, six character states in the plants found in 2019 agree well with the ones for *P. parviflora*: upper leaves clasping the stem, some upper leaf blades widest near their base, a pair of weak primary veins arising near the base of the leaf blade, bluntly toothed leaves, longest non-glandular trichomes $\leq$ 0.15 mm, and nutlet length 2.1–3.3 mm. Two character states do not agree well: the pressed flowers are up to 18 mm long, exceeding the 16 mm upper extreme recognized by Cantino (1981; 1982), and the corollas lack minute stalked glands on the exterior surface near their apex, which Cantino (1981) found on more than 90% of the *P. parviflora* specimens that he studied. The Duluth plants from 2019 agree with four of the eight character states for *P. virginiana* (including both floral traits) and three of the eight for *P. ledinghamii*. There were no *Physostegia* other than *P. parviflora* seen near the 2019 collection site. Boivin (1966) ranked *P. parviflora* as a variety of *P. virginiana*. Cantino (1981) proposed that hybridization between *P. parviflora* and *P. virginiana* occasionally occurs without the chromosome doubling thought to produce *P. ledinghamii*, and may have resulted in morphologically anomalous plants collected from near Thunder Bay, Ontario. The

flowers of the 2019 Duluth plants reported here are consistent with having a genetic influence from *P. virginiana*. In the absence of better evidence for hybrid origin we assign these plants to *P. parviflora* in concordance with the criteria of Cantino (1982). The 1936 Lakela specimen has stalked glands on its lone corolla, with a total flower length of about 16 mm (the corolla is in two pieces). Its leaf teeth are a little more well-defined and forward-pointing than those of the 2019 collection, but not extremely different from them. It also appears to best fit *P. parviflora*, although there are no nutlets to measure. The complex nature of variation in *Physostegia* means that keys to aid in identification must also be complex (Cantino 1982), more than it is reasonable to try to recount here. Greater understanding of variation in *Physostegia* will no doubt require the use of molecular methods (P. D. Cantino, personal communication).

Specimen Citations. MINNESOTA. St. Louis Co.: Duluth, T49N R14W, flowering, August 25, 2019 (nutlets collected September 6, 2019), *Schimpf 1011* (DUL); Duluth, T49N R14W, flowering, August 19, 1936, *Lakela 1774* (DUL).

Pulmonaria montana Lej.
Boraginaceae
Mountain lungwort

Significance of the Report. Apparently the first collection of this non-native forb from outside of cultivation in North America north of Mexico.

Previous Knowledge. *Pulmonaria* L. is composed of heterostylous herbaceous perennials that are native to an area including most of Europe extending to central Asia (Bennett 2003). Morphological distinctions among many of its approximately 15 species can be difficult to make (Meeus et al. 2016). Much of the genus is in ornamental cultivation (Bennett 2003), with many taxa having spotted leaves and a capacity to grow and flower in considerable shade. Neither Fernald (1950) nor Gleason and Cronquist (1991) included *Pulmonaria* as an escape in the floristic region of the northeastern United States and adjacent Canada, and the *Flora of North America, north of Mexico* is not scheduled to include any species of *Pulmonaria* in its treatment of the Boraginaceae (Flora of North America 2023). *Pulmonaria montana* has apparently not been collected from outside of cultivation in North America. Bennett (2003) stated that *P. montana*, a native of woodlands in central and western Europe, was at best rare in cultivation.

Discussion. Two clumps of *Pulmonaria montana* with a total of six flowering stems were found growing close together next to a stream in a narrow bedrock canyon in Duluth, Minnesota. There were also two smaller non-flowering plants about 20 cm from the flowering ones. The canyon is in a public forest park, but the stream passes through residential properties 1–4 km upstream from the collection site. Plant parts sufficient for propagation could have been carried by floodwaters; a patch of *P. montana* of about 0.5 m^2 was later found within 1 m of the normal water's edge in a shady residential yard about 3 km upstream from the collection site. Neighboring species at the collection site included *Agrimonia striata* Michx., *Circaea alpina* L., *Equisetum pratense* Ehrh., *Myosotis scorpi-*

oides L., *Ranunculus acris* L., *Rubus parviflorus* Nutt., *Solidago gigantea* Aiton, and *Valeriana officinalis* L. The public footpath is not on the side of the stream where *P. montana* was found. The site was shaded by the canyon walls and large deciduous trees, most immediately *Salix* ×*fragilis* L. The soil is kept moist by proximity to the stream. In June 2020 the four stems that remained after the 2019 collection flowered like they did in 2019. Most flowers did not set fruit, but a few of them had well-developed nutlets in July 2020. In June 2021 there were seven plants, none of which flowered that year but all of which looked healthy. In 2022 four of them were in flower.

Diagnostic Characters. Bennett (2003) cited *Pulmonaria mollis* Wolff ex F. Heller as the commonly cultivated species most resembling *P. montana*; both have thick black rhizomes and leaves that tend to lack spots, the leaves dying back by the following spring. In *P. montana* "summer" (basal) leaves have harsher pubescence and inflorescences are less viscid, as compared to *P. mollis* (Merxmüller and Sauer 1972). The Minnesota plants had leaf blades that are a dull light green (darker after drying) and taper gradually to the petiole. The corolla limbs and upper tube emerged reddish pink and matured bluish. The base chromosome numbers of *P. montana* and *P. mollis* are not the same (Merxmüller and Sauer 1972). If these Minnesota plants are actually *P. mollis* they would also be a floristic novelty for North America north of Mexico (Kartesz 2015; USDA NRCS 2022). Bailey and Bailey (1976) treated *P. rubra* (with no author listed) as a synonym of *P. montana*, and this equivalence may be found in popular works (e.g., Engebretson and Williamson 2004). Merxmüller and Sauer (1972) described *Pulmonaria rubra* Schott as having corollas that remain red throughout their development, leaf blades that contract abruptly to the petiole, a different chromosome number, and a native range that does not overlap that of *P. montana*; *P. rubra* is not reported from North America (Kartesz 2015; USDA NRCS 2022).

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 13, T50N R14W, flowering, June 8, 2019 (summer leaf collected July 7, 2019), *Schimpf 977* (DUL).

Pulmonaria officinalis L.
Boraginaceae
Common lungwort

Significance of the Report. Apparently the first collection of this non-native ornamental forb from outside of cultivation in Minnesota.

Previous Knowledge. See the previous species for information about the genus. *Pulmonaria officinalis* is native across much of continental Europe (Merxmüller and Sauer 1972) and is widely naturalized in Great Britain (Meeus et al. 2013). It typically has spotted leaves and is cultivated as an ornamental (Bennett 2003); collections of its North American escapes from gardens are known from northwestern Washington, western Montana, and Ontario (Kartesz 2015), as well as other sites (vPlants 2023). Its traditional use to treat respiratory distress (Bennett 2003) has been limited, and there has not been extensive mod-

ern research on potential medicinal applications (references in Meeus et al. 2013). The nutlets bear a basal elaiosome and are known to be carried by ants (references in Meeus et al. 2013).

Discussion. A population of *Pulmonaria officinalis* was found in a public forest park in Duluth, Minnesota, in which the plants were at a high density across about 10 m^2. There were also clumps disjunct by up to several meters from the edge of the dense area. The calyces were near the ground after the post-flowering stems relaxed and became decumbent, and each contained 2–3 glossy nutlets that were green, dark brown, or in color transition. The site had light deciduous shade, mostly from *Fraxinus nigra* Marshall that ranged to 15–20 cm diameter at breast height and were in early leaf at the time of collection. Dead wood on the site indicates that a few large *Betula papyrifera* Marshall trees must have dominated the canopy previously. Associated species were *Prunus virginiana* L., *Rubus parviflorus* Nutt., *Ribes americana* Miller, and *Lonicera morrowii* A. Gray. A residential area is only about 50 m away, across a street, but the site did not look like it had been used for disposal of yard debris. The soil was sandy loam with some fine gravel, moderately drained.

Diagnostic Characters. Truncate or cordate bases of the blades of the "summer" (basal) leaves separate *Pulmonaria officinalis* and *P. obscura* Dumort. from the rest of the genus (Merxmüller and Sauer 1972). The plants we collected had light green spots on darker green blades with cordate bases. The limbs and upper tubes of the corollas emerged reddish pink and matured bluish. These two species can be difficult to distinguish, and have often been treated as subspecies of *P. officinalis* (Meeus et al. 2013). *Pulmonaria obscura* seems not to have been reported as escaped in North America (Kartesz 2015). We chose to include our collection within a broad concept of *P. officinalis*.

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, NW¼ Sec. 23, T50N R14W, flowering and fruiting, May 27, 2021 (nutlets collected June 10, 2021), *Schimpf 1054* (DUL).

Rosa cinnamomea L.
Rosaceae
Cinnamon rose

Significance of the Report. Apparently the first collections of this non-native ornamental shrub from outside of cultivation in Minnesota.

Previous Knowledge. *Rosa cinnamomea* is a deciduous shrub with a large native Palearctic range and with "double-flowered" horticultural selections that are grown ornamentally in North America (Lewis et al. 2014). Its escape from cultivation is documented by collections from many places in eastern Canada and the northern part of the eastern United States, but apparently not west of counties on the western shore of Lake Michigan (Kartesz 2015).

Discussion. Cinnamon rose was found at two sites in the Duluth, Minnesota area. One was along a few meters of the well-lit edge of a thicket on a public tract that long ago may have been actively landscaped, across an alley from residences. The natural vegetation would probably be upland northern hardwood forest. The vigor of this colony seemed diminished by 2020. The other was

mixed with tall grasses, predominately *Phalaris arundinacea* L., on a sunny margin of a rural parking area. The ground surface had small irregular piles of soil, perhaps from creating the parking area. The U. S. Geological Survey 7.5′ Duluth Heights topographic map from 1953 shows several buildings there. The adjacent natural vegetation was southern boreal forest. These roses occupied about 5 m^2, and were still there in autumn 2021, bearing numerous stem galls. Both sites had moderate drainage.

Diagnostic Characters. Lewis et al. (2014) should be consulted for distinguishing among the many *Rosa* L. taxa in the wild in North America. *Rosa cinnamomea* is rhizomatous and up to about 2 m tall; has leaflets that are glabrous above and glaucous beneath; has stout paired infrastipular prickles and usually lacks internodal prickles; and has stipules that are adnate to the petiole, entire, and often convolute. The typical flowers in North American escapes are 3–5 cm across, have extra petals, and fail to form fruits (Lewis et al. 2014).

Specimen Citations. MINNESOTA. St. Louis Co.: Duluth, Sec. 22, T50N R14W, flowering, June 21, 2017, *Schimpf 889* (DUL, MIN); Canosia Twp., SW¼SW¼Sec. 26, T51N R15W, flowering, June 21, 2017, *Pomroy 2947* (DUL).

Sedum album L.
Crassulaceae
White stonecrop

Significance of the Report. Apparently the first collections of this non-native ornamental perennial from outside of cultivation in Minnesota.

Previous Knowledge. An evergreen herbaceous succulent, *Sedum album* is native to most of Europe (Webb et al. 1993) and escapes from ornamental cultivation in North America (Ohba 2009). Non-cultivated plants are documented from several counties just east or south of Lake Michigan, as well as widely scattered locations east from there to the Atlantic Ocean and west of the continental divide, but none from Wisconsin or Minnesota (Kartesz 2015; USDA NRCS 2022).

Discussion. Vegetative and flowering colonies of *Sedum album* were found growing on gently sloping bedrock at two locations in Duluth, Minnesota. The earlier collection was from a small colony on an extensive bedrock exposure in deciduous thickets at the remote edge of a large residential lot. *Sedum album* was much less common there in 2010 than the non-native succulents *Phedimus aizoon* (L.) ‘t Hart and *Sedum acre* L., making its longer-term persistence questionable; in 2020 we failed to relocate it there, but the other succulent taxa were abundant. The second site is on an outcrop just a few meters across, next to an alley, downslope from woody vegetation and in partial deciduous shade. A house across the alley, screened by a tall hedge, is the closest residence. The bedrock appears to get occasional tire traffic, which may limit the local spatial extent of the stonecrop. The *S. album* colonies grew in small gravelly pockets across an area of about 2 m^2, near the non-native succulents *Phedimus kamtschaticus* (Fisch.) ’t Hart and *P. spurius* (M. Bieb.) ’t Hart. *Sedum album* was not in flower at this second site when we saw it there in 2001, but was collected in flower in

2020. *Sedum thartii* L. P. Hébert (Gallo and Zika 2014) grows in slightly deeper soil just upslope, and was reported as *S. reflexum* L. by Schimpf and Pomroy (2005). With these observations of flowering shoots in two places we can now regard *S. album* as having some tendency to establish itself in this area. The co-located succulents suggest possible former cultivation at or near both places, but the sites give no impression of having been tended for many years, if ever. No other typically cultivated taxa were seen on either site.

Diagnostic Characters. *Sedum album* forms low mats with blunt sausage-shaped glabrous leaves that are slightly flattened adaxially. The leaves are dull medium green, with dark red overtones on some of these colonies. At these sites leaves measured up to 11×3 mm, although larger ones are known (Ohba 2009). The flowering stems rise well above the mat and their leaves are more widely spaced. Inflorescences are congested with numerous 5-parted flowers just a few mm across that have white petals (pink in some cultivars) and 10 red anthers. Many smaller colonies were not flowering. The more widely escaped *S. acre* forms mats of similar stature and texture on bedrock or sand. Its leaves are more angular than those of *S. album* and distinctively yellow-green, and its petals and anthers are yellow (Ohba 2009).

Specimen Citations. MINNESOTA. St. Louis Co.: Duluth, Sec. 13, T50N R14W, flowering, July 3, 2010, *Schimpf 594* (DUL); Duluth, Sec. 14, T50N R14W, flowers just about to open, June 23, 2020, *Schimpf 1031* (DUL).

Verbena bonariensis L.
Verbenaceae
Buenos Aires vervain

Significance of the Report. Apparently the first collection of this non-native ornamental forb from outside of cultivation in Minnesota.

Previous Knowledge. *Verbena bonariensis* is an annual, native from southern Brazil to northern Argentina and naturalized from ornamental cultivation in milder climates of the continental United States and other parts of the world (Nesom 2010b). Nesom (2010b) treated eglandular plants with smaller flowers as *Verbena incompta* P. W. Michael and found them to be more common and widespread in the United States than *V. bonariensis*, with occurrences in eastern Canada as well. He noted that *V. incompta* may live as a perennial for a few years. Wann (2000) described *V. bonariensis* as a perennial. Older works typically treat all of these plants as *V. bonariensis* and describe that species as annual or perennial. The name purpletop vervain has been applied to both of these species (USDA NRCS 2022). Kartesz (2015) showed *V. bonariensis* as recorded from many counties in the Carolinas and Georgia, but nowhere else, with *V. incompta* much more widely recorded. In the vicinity of the Great Lakes, collections of *V. bonariensis* since 2003 have been reported (vPlants 2023) from an open weed area of an arboretum in Lake County, Ohio (SNM 9025), a trash dump in Dane County, Wisconsin (WIS v260130), and reproducing on a site where a home had been demolished in DuPage County, Illinois (MOR 58081, 58349). We have not seen those specimens or online images of them. The same

website (vPlants 2023) showed no collections of *V. incompta* from the Great Lakes region.

Discussion. Ten stems of *V. bonariensis* were found flowering on Minnesota Point in Duluth, Minnesota in 2019. The plants had robust ascending stems. They were along a road near a public boat landing on Superior Bay of the lower St. Louis River. The soil is very sandy, there is full exposure to sun, and the site frequently had shallow water over the surface in 2019. No cultivated examples of *Verbena* L. were noticed in the vicinity. Minnesota Point, a narrow peninsula of sand that separates Superior Bay from Lake Superior for 11 km, is known for having a growing season that is longer but cooler than that of the general mainland. Seed maturation was not evident at the time of collection, which is rather late in the growing season, and the species was not found there in 2020 or 2021. We can regard it as a waif at this site.

Diagnostic Characters. Among *Verbena* species that have three-branched inflorescences with the central spike subsessile and relatively broad, *V. bonariensis* is separable by its clasping to subclasping leaf bases; stalked glands on its calyces, peduncles, and distal stems; and corolla tubes longer than 4 mm (Nesom 2010b). The somewhat similar South American perennial *V. rigida* Spreng. is widely naturalized in the southern United States (Kartesz 2015) and can be grown as an annual in the north (Brickell and Zuk 1997). It differs by having horizontal rhizomes, a continuous band of chlorenchyma in its aerial stems (O'Leary et al. 2007; Nesom 2010a), bracts longer than its calyces, and corollas generally larger than those of *V. bonariensis* (Small 1933). No such rhizomes were found on the Duluth plants, which were easily uprooted from the loose soil. Microscopic examination of free-hand cross-sections of their live aerial stems revealed interruption of their chlorenchyma band by a thick column of sclerenchyma fibers at each of the stem's four angles.

Specimen Citation. MINNESOTA. St. Louis Co.: Duluth, Sec. 13, T49N R14W, flowering, September 26, 2019, *Schimpf 1025* (DUL, MIN).

ACKNOWLEDGMENTS

We thank Lauren Boyle, Philip Cantino, John Kartesz, and Alan Whittemore for providing consultation.

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NOTEWORTHY COLLECTIONS

THE REDISCOVERY OF *SAGITTARIA BREVIROSTRA* MACK. & BUSH (ALISMATACEAE) AND A NEW RECORD OF *ZANNICHELLIA PALUSTRIS* L. (POTAMOGETONACEAE) IN SOUTHWEST MICHIGAN

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The following two species were discovered during a floristic inventory of a portion of the Galien River Marsh in southwestern Berrien County, Michigan. Both species occupied habitat along the south bank of the Galien River in an area where dense stands of the invasive *Phalaris arundinacea* L. (reed canary grass) were treated with herbicide beginning in 2016. High water levels in 2018–2021 resulted in the development of submergent marsh in this area.

Sagittaria brevirostra Mack. & Bush
Alismataceae
Short-beaked Arrowhead

Significance of the Report. The first collection in the state of Michigan since 1861

Previous Knowledge. *Sagittaria brevirostra* Mack. & Bush, commonly called short-beaked arrowhead (Figure 1), is an aquatic, emersed perennial that grows in ponds, marshes, lakes, and streams or riverbanks (Haynes and Hellquist 2000a). It is concentrated in eastern Nebraska, eastern Kansas, Iowa, Missouri, and Illinois, with scattered occurrences extending as far as Colorado, New Mexico, Minnesota, Virginia, and Alabama (Kartesz 2015). It is considered a species of conservation concern in Colorado, Illinois, Michigan, Minnesota, Tennessee, and Virginia (NatureServe 2022). Charles Deam stated that *S. brevirostra* was "probably our most common species" of *Sagittaria* in Indiana with collections as far north as Lake and St. Joseph Counties (Deam 1940;

FIGURE 1: *Sagittaria brevirostra* (female flowers). Photo by Nathanael J. Pilla.

Wilhelm and Rericha 2017). It has been frequently collected in northeast Illinois with collections in every county except for Lake County (Wilhelm and Rericha 2017). Prior to this report, *S. brevirostra* was presumed extirpated (SX) in Michigan with a state status of Special Concern (SC) (Michigan Natural Features Inventory 2021). There have been two historical collections in Michigan, one from Jackson County in 1838 [Wright, MICH1282220] and one from Washtenaw County in 1861 [Almendinger, MICH1282221].

Discussion. On July 26, 2021, three individuals of *Sagittaria brevirostra* were observed growing approximately 15 meters west of the Galien River County Park boardwalk on the south side of a sandbar adjacent to the Galien River. None of the individuals had fully mature fruit or flowers. The population was revisited by the first author and botanist Nate Scheerer on September 6, 2021, when three additional individuals were observed closer to the boardwalk on the southeast side of the sand bar. These individuals were in full flower, and one bore mature fruit. *Sagittaria brevirostra* might have previously been overlooked at the site due to its scattered presence within a large population of the very similar *Sagittaria latifolia* Willd. (common arrowhead).

Diagnostic Characters. Twenty-four species of *Sagittaria* are recognized in North America north of Mexico (Haynes and Hellquist 2000a), seven of which are documented in Michigan (Voss and Reznicek 2012). *Sagittaria brevirostra* is differentiated morphologically from other North American species of *Sagittaria* by the following combination of characters: long lower bracts (often more than

1.5 cm long) which are distinct or fused less than ¼ of their lengths; sagittate leaves; beaks of the achenes 0.4–0.7 mm long; and glabrous filaments (Haynes and Hellquist 2000a; Voss and Reznicek 2012; Wilhelm and Rericha 2017).

Specimen Citation. MICHIGAN. Berrien Co.: City of New Buffalo. 41.80881, –86.719269. Material collected on the edge of a sand bar adjacent to the Galien River. Three individuals were growing with *Sagittaria latifolia,* with the latter being dense throughout the sand bar. Associated species: *Cyperus odoratus*, *Cyperus strigosus*, *Ludwigia palustris*, *Lycopus americanus*, *Lythrum salicaria*, *Penthorum sedoides*, and *Rosa palustris*. July 26, 2021, *Pilla and Engel NJP.2107.2602.p.* (MICH).

Zannichellia palustris L.
Potamogetonaceae
horned pondweed

Significance of the Report. First collection from southwestern Lower Michigan.

Previous Knowledge. *Zannichellia palustris* L., commonly called horned pondweed (Figure 2), is an aquatic, submersed perennial that grows in alkaline, brackish, and freshwater streams and lakes (Haynes and Hellquist 2000b; Crow and Hellquist 2006). It has a worldwide distribution (Haynes and Hellquist 2000b). Within the eastern United States, *Z. palustris* appears to be local with several clustered areas of occurrence (Kartesz 2015). In Michigan, *Z. palustris* was historically known from several counties in southeastern Lower Michigan, one historical record from the Saginaw Bay region, and scattered counties on the northern Lake Michigan shoreline in northern Lower and eastern Upper Michigan (MICHIGAN FLORA ONLINE 2011).

Discussion. The *Zannichellia palustris* population was observed on July 26, 2021, scattered on sandy substrates in 15–20 cm of water in small drainage channels behind fresh alluvial deposits along the Galien River. The population was scattered in these channels. This collection is the first documented report of this species for Berrien County. A 2020 collection (not seen by us) from Kalamazoo County and deposited in the Michigan State University Herbarium (MSC) is reported in Cole-Wick et al. (2021). Together, these collections represent the first records from southwestern Lower Michigan. Surveys for additional populations of *Zannichellia palustris* are recommended to better understand its distribution and abundance in Michigan.

Diagnostic Characters. *Zannichellia palustris* is superficially similar to other submergent, thin-leaved aquatic plants, especially those in the Potamogetonaceae. *Zannichellia* can be identified by its lack of floating leaves; opposite to whorled submergent, entire leaves; single seeded fruits; and axillary, submergent inflorescences (Haynes and Hellquist 2000b; Crow and Hellquist 2006; Voss and Reznicek 2012).

Specimen Citation. *Zannichellia palustris* L. MICHIGAN. Berrien Co.: City of New Buffalo. 41.808663, –86.720177. Material collected from a small dense stand in shallow sandy soil of the Great Lakes Marsh within about 6” of water. Dense floating algae could pose a threat. Locally common in areas of flowing

FIGURE 2: *Zannichellia palustris*. Photo by Nathanael J. Pilla.

water. Associated species: *Ceratophyllum demersum*, *Lemna turionifera*, *Ludwigia palustris*, *Potamogeton crispus*, *Potamogeton foliosus*, *Spirodela polyrhiza*, *Wolffia borealis*, and *Wolffia columbiana*. July 26, 2021, *Pilla and Engel NJP.2107.2601.p.* (MICH).

ACKNOWLEDGMENTS

We thank Mitch Alix, Purdue University Northwest, for confirming the identity of *Sagittaria brevirostra*. Tyler Bassett, Ashley Cole-Wick, Erik Elgin, and Elizabeth Haber, Michigan Natural Features Inventory, for their willingness to share their data and knowledge on distribution and collection, Nathaniel Scheerer for providing assistance in data collection, and Bradford Slaughter, Orbis Environmental Consulting, for providing constructive comments on the formation of the manuscript.

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NOTEWORTHY COLLECTIONS

RECORDS OF SOME ADVENTIVE OR NATURALIZED PLANT SPECIES IN ONTARIO

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Anthyllis vulneraria L. (Figure 1)
Fabaceae
Common Kidney-vetch, Woundwort, Lady's-fingers.

Significance of the report. *Anthyllis vulneraria* is rarely adventive or naturalized in the Great Lakes region. Prior to this report there had been no reports of this species from Ontario for over a century.

Previous knowledge. *Anthyllis vulneraria* is native to much of Europe and the Mediterranean region. Introduced populations have been reported from widely scattered sites in North America but have remained few and highly localized. Most records of *A. vulneraria* in North America have been from ephemeral occurrences, in some cases derived from contaminants in clover seed, rather than representing established populations. As of 2022, according to the Natural Heritage Information Centre (2022), no recent records of *A. vulneraria* in Ontario were known. The most recent report listed was from Oxford County, where it had been found in 1909 (Mitchell 1910). Older records were listed only from Oxford and Wellington counties and what is now the Regional Municipality of Waterloo. In Michigan, MICHIGAN FLORA ONLINE (2011) recorded *A. vulneraria* only from Mackinac County, where it had been found at one locality in 1934 and another in 2008, but Voss (1985) also noted an ephemeral occurrence in Ingham County in 1897. It has been reported from six counties in New York, but according to Werier et al. (2022) its naturalization status there is not known. Cooperrider (1995) did not list this species in the flora of Ohio, although it had previously been reported from Lake County by Shaffner (1932). The Ohio State University herbarium (OS) web site (Museum of Biological Diversity 2023) shows two specimens from a single collection in Lake County in 1927.

Discussion. At the site reported here, plants of *Anthyllis vulneraria* were present along an old farm road, now a trail, well outside Hamilton's urban boundary, on Hamilton Conservation Authority land. Although the population extended over a wide area, there were no large or dense stands. The plants were in open areas in a successional plant community with scattered buckthorns and young white cedars and sugar maples, in rocky, calcareous soils, among other natural-

FIGURE 1. *Anthyllis vulneraria*, Hamilton, Ontario. Photograph by the author.

ized species, including *Lotus corniculatus* L. and *Securigera varia* (L.) Lassen. Whereas Montgomery (1957) said that in Ontario, *A. vulneraria* was "an occasional introduction but never persisting," this Ontario population is well established, having spread throughout an area ca. 0.6 km long and having persisted for more than 21 years. Eventually it will probably be vulnerable to increasing shade if vegetational succession is permitted to advance at the site.

As populations of *Anthyllis vulneraria* in North America have remained few,

scattered, and usually of short duration, and the plants do not form dense stands, this species seems unlikely to become an aggressive colonizer.

In Europe, *Anthyllis vulneraria* has been divided into numerous subspecies, differing in characters including plant size, stem branching, numbers of leaflets per leaf, calyx vestiture, and red vs. yellow corollas. Intermediates are so common, however, that formal infraspecific classification sometimes appears hardly feasible, especially since some of the subspecies are cultivated for fodder beyond their native ranges, increasing the opportunities for interbreeding (Cullen 1968). North American references generally do not distinguish subspecies of *A. vulneraria*. The morphology of the plants reported here suggests that they may be derived from past interbreeding of subsp. *vulneraria* and the widely cultivated subsp. *carpatica* (Pant.) Nyman. This combination is common in parts of Europe.

Diagnostic characters. Naturalized populations of *Anthyllis vulneraria* are variable, depending on their geographic origin; this description is based largely on the population reported here. Plants of *A. vulneraria* are herbaceous perennials, one- or few-stemmed, 20–50 cm tall, with the stem simple or occasionally few-branched. The basal leaves are usually simple, elliptic-oblong, often with a few small lobes near the base of the blade, or occasionally with a few minute leaflets; the cauline leaves are few, alternate, odd-pinnately compound. The leaflets of the cauline leaves are usually 3 to 7, narrowly elliptic or the smaller leaflets linear, with the terminal leaflet usually longer than the lateral leaflets. The inflorescence is a dense, terminal head subtended by two deeply palmately lobed bracts, or more often two heads, sometimes so close together that they appear as one, comprising numerous flowers. The flowers are pentamerous, papilionaceous, 12–15 mm long. The sepals are united, silky-haired. The petals are separate, each narrowed proximally into a very slender claw, bright yellow, the banner petal with red markings. The fruit is a short-stipitate, indehiscent legume with one or occasionally two seeds.

In the Great Lakes region, the species with which *Anthyllis vulneraria* would most likely be confused is *Lotus corniculatus* L., bird's-foot trefoil, which likewise has papilionaceous flowers in heads, with wholly or predominantly yellow corollas similar in size to those of *A. vulneraria*. When these species grow in the same habitat, as at the site reported here, *A. vulneraria* is generally taller than *L. corniculatus*. Unlike those of *A. vulneraria*, the leaves of *L. corniculatus* are consistently trifoliolate. The inflorescences of *L. corniculatus* are not subtended by deeply cleft bracts, nor are the calyces silky-haired. The fruits of *L. corniculatus* are elongated, multi-seeded pods. Forms of *Medicago sativa* L. s. lat., alfalfa, with yellow corollas likewise differ in having trifoliolate leaves and in lacking silky hairs on the calyx. *Medicago lupulina* L., black medic, and the several species of *Trifolium* L., clovers, with yellow corollas, have trifoliolate leaves and much smaller flowers, 2.5–6.5 mm long.

Specimen citations. CANADA. ONTARIO. City of Hamilton (historically Wentworth Co., West Flamborough Twp.): Along the trail north from Safari Road at address sign 1535, west of Westover Road, in open sites in an area with shrubs and scattered trees, in rocky, calcareous soil, 43.35°N, 80.11°W, June 25, 2021, *Pringle 2692* (HAM) and June 14, 2022, *Pringle 2694* (HAM).

Although there have been no published reports of *Anthyllis vulneraria* in Ontario since 1910, there are three specimens at HAM that date from 2002 through 2013, all from the same site as those cited above: *Rothfels & Hunsberger CJR143*, *Rothfels et al. 744*, and *Doherty & Stone 2*.

Sedum sexangulare L. (Figure 2).
Crassulaceae
Six-angled Stonecrop, Hexagon Stonecrop

Significance of the report. In the Great Lakes region, *Sedum sexangulare* is known to occur outside of cultivation in only a few scattered localities. In Ontario it has previously been reported only from the vicinity of Ottawa.

Previous knowledge. *Sedum sexangulare* is native to continental Europe and is cultivated elsewhere as a rock-garden plant. There are few reports of its occurrence outside of cultivation in North America, although *S. sexangulare* may sometimes have been misidentified as *S. acre* L., a similar species that has been included in regional floras for many years whereas until recently *S. sexangulare* has not been included in such references.

Sedum sexangulare was first reported as naturalized in North America by Hodgdon (1959), who had found it in New Hampshire in 1942 but did not identify it as *S. sexangulare* until 1958, at which time it was still present where he had found it 16 years earlier. In 1976, I was the first to recognize it in Michigan, when I was shown a collection that was misidentified at the time as *S. acre*, and which was subsequently reported as *S. sexangulare* by Voss (1977, 1985). By 2011, it was known from five counties in Michigan (MICHIGAN FLORA ONLINE 2011). In New York, it has been reported only from Rensselaer County (Werier et al. 2022). There are now reports from scattered localities in a few other states, from New England west to Illinois (Ohba 2009). It was first reported from Ontario and from Canada by White (1979; see also Brunton 1985), who found it near Ottawa in 1979. In 2022 the Natural Heritage Information Centre (2022) listed it only from the vicinity of Ottawa, ca. 460 km east-northeast of the locality reported here.

Discussion. At the site reported here, *Sedum sexangulare* grew in an open, disturbed area, largely dominating an area ca. 12 × 12 m, along with grasses and a few other herbaceous plants, near a paved trail on the site of a former railroad. This site was on the sandbar called the "Beach Strip" that separates Hamilton Harbour from Lake Ontario. Although this site was uncultivated, a "waste place" in the wording of old floras, parts of the Hamilton "Beach Strip" west of the north-south trail include roads and residential and commercial buildings.

Sedum sexangulare is well adapted to survival and spreading in sunny areas where the soil rapidly becomes dry, but, like *S. acre*, is it unlikely to compete with native species unless perhaps in alvars.

Diagnostic characters. *Sedum sexangulare* is similar to *Sedum acre*. Plants of *S. sexangulare* are perennial, rooting from the decumbent stem bases and forming clumps, patches, and mats (Figure 2). The vegetative stems are numerous, distally erect, mostly 2–7 cm; the flowering stems are up to 10(–15) cm tall. The leaves are closely spaced on the vegetative stems and proximally on the

FIGURE 2. *Sedum sexangulare*, Hamilton, Ontario. Photograph by the author.

flowering stems; those on the vegetative stems are usually in six ranks, succulent, bright green, cylindric or nearly so, 3–6 × 0.7–1.2 mm. The inflorescence is a more or less flat-topped cyme of 1 to 25 flowers, with all but the smallest inflorescences usually having three major divisions. The flowers are actinomorphic, with the sepals and petals all separate. There are 5 sepals, which are inconspicuous, yellowish green, narrowly oblong, 0.8–1 × 0.4–0.5 mm; 5 petals, which are bright yellow, lanceolate, 3–4 mm long × 0.8–1.1 mm where widest; ten stamens, with both the filaments and the anthers yellow; and 5 pistils. The fruits are septicidal, several-seeded capsules.

From the more widely cultivated and naturalized *Sedum acre*, which is also present on the Hamilton "Beach Strip" (*Iwanycki & Pringle 268*, HAM) and other nearby sites, *S. sexangulare* is most readily distinguished by the shape of its leaves. In contrast to the cylindric leaves of *S. sexangulare*, which are commonly described as being shaped like slightly compressed sausages, the leaves of *S. acre* are ovate (or nearly ovoid, considering their thickness), widest proximal to mid-length. The flowers of *S. sexangulare* are smaller than those of *S. acre*, the latter having petals 5–9 mm long.

The names "tasteless stonecrop" for *Sedum sexangulare* and "bitter stonecrop" or "biting stonecrop" for *S. acre* indicate another difference between these species, as the specific epithet *acre*, like its English cognate *acrid*, means "having a strong, irritating, unpleasant taste."

Specimen citations. CANADA. ONTARIO. City of Hamilton: "Beach Strip" between Hamilton Harbour and Lake Ontario, west side of Breezeway Trail a short distance south of the trail information centre, in a sunny site with sandy soil, with grasses, 43.29°N, 79.79°W, July 6, 2022, *Pringle 2696* (HAM).

A Noteworthy Non-record:

Achyranthes japonica (Miq.) Nakai
Amaranthaceae
Japanese chaff-flower

Achyranthes japonica (Miq.) Nakai, a species native to eastern Asia, was first found as a naturalized species in North America in 1981 along a tributary of the upper Ohio River in Kentucky (Medley et al. 1985; Kamstra 2020). It is now recognized as a highly invasive species, primarily invading natural areas, in which it forms dense, extensive colonies that disrupt ecosystems and displace native species, and thus may adversely affect rare and endangered species (Schwartz et al. 2016; Kamstra 2020).

As of 2003 *Achyranthes japonica* was still known in North America only from the Ohio River watershed in Kentucky, Ohio, and West Virginia (Robertson 2003), but soon thereafter it was found to have spread downstream to the lower Mississippi River valley and to be present in additional scattered localities in the southeastern United States. It was found in Canada in 2018 by Kamstra (2019, 2020) on two of the Erie Islands, Ontario. Kamstra reported that *A. japonica* had spread alarmingly on East Sister Island, a Provincial Nature Reserve, and Middle Island, part of Point Pelee National Park, where it had formed patches consisting of thousands of plants. Control measures using herbicide were initiated following these discoveries.

In 2020, in an online posted response to Kamstra (2020), Kathy Ouellette reported having seen *Achyranthes japonica* in Harrow, Essex County, Ontario. This was the first report of this species from the Ontario mainland. Because she neither cited herbarium specimens nor provided photographic documentation, I visited the site to document this report, if it was correct, because several native species, especially *Phryma leptostachya* L. (lopseed), resemble *A. japonica* and may be confused with it.

Ouelette's report included detailed locality data: Along the Chrysler Canada Greenway, a trail following a former railroad bed, behind Robinson's Transport. On September 25, 2022, I searched the sides of the trail south from Concession Road 4 to a point beyond the section of the trail where the Robinson's Transport property abuts the former railroad right-of-way and found no *Achyranthes japonica*. I did find *Phryma leptostachya* (documented at this site by *Pringle 2697*, HAM), a species that Medley et al. (1985) and Kamstra (2020) had mentioned as resembling *A. japonica* in appearance. In the absence of *A. japonica* at the site, as indicated by my search, and the presence of a species with which *A. japonica* is easily confused, I believe that this report of *A. japonica* on the Ontario mainland should be discounted unless documentation can be provided. It

also seems appropriate to provide here a more thorough contrast between *P. leptostachya* and *A. japonica* than previous reports have included.

Both *Phryma leptostachya* and *Achyranthes japonica* have simple, opposite, short-petioled leaves with acuminate apices, and both bear flowers and fruits in long, slender spikes. In both species, the fruits are strongly deflexed at maturity, and readily become caught in fur, feathers, and clothing. The leaf blades of *P. leptostachya* are ovate, widest proximal to mid-length, with prominently serrate margins; those of *A. japonica* are elliptic or nearly so, widest near mid-length and tapering nearly symmetrically to the petiole and apex, with margins that are entire or slightly wavy but not toothed. The flowers and fruits of *P. leptostachya* are in distinct pairs, each pair at right angles to the pairs above and below it; those of *A. japonica* are not in pairs, but instead spiral individually around the axis of the inflorescence. (In *A. japonica* this arrangement may be evident only in fruit; the flowers are densely crowded, but the fruits become more widely separated as the axis of the inflorescence elongates.) In flower, *P. leptostachya* can be distinguished from *A. japonica* by its small, bilabiate, purple-and-white corolla. *Achyranthes japonica* has no corolla; the perianth consists of pale green sepals largely concealed by bracteoles.

The disseminules of both species comprise a one-seeded indehiscent fruit plus the persistent calyx and bracteoles at the base. In *Phryma leptostachya* the bracteoles, unlike those of *Achyranthes japonica*, are minute; the disseminules adhere to fur and clothing by hooks at the apices of the three dorsal lobes of the calyx, which consists of sepals united much of their length. In *A. japonica*, the disseminules include not only the fruit and the persistent sepals, which are united only basally, but also two firm, spinelike bracteoles that can become caught in fur, feathers, or fabric.

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